

Polycystic Kidney Disease, Acute Kidney Injury, and Chronic Kidney Disease

There are several disorders that affect the renal system and its ability to function. These disorders include acute kidney injury, chronic kidney disease, and polycystic kidney disease.

The kidneys regulate fluid, acid-base, and electrolyte balance, and eliminate wastes from the body.

Kidney failure is diagnosed as acute kidney injury or chronic kidney disease. Without aggressive treatment, or when complicating preexisting conditions exist, acute kidney injury can result in chronic kidney disease.

Acute kidney injury

Acute kidney injury (AKI) is the sudden cessation of renal function that occurs when blood flow to the kidneys is significantly compromised. Manifestations occur abruptly.

PHASES

- **Onset:** Begins with the onset of the event, ends when oliguria develops, and lasts for hours to days.
- **Oliguria:** Begins with the kidney insult; urine output is 100 to 400 mL/24 hr with or without diuretics; and lasts for 1 to 3 weeks.
- **Diuresis:** Begins when the kidneys start to recover; diuresis of a large amount of fluid occurs; and can last for 2 to 6 weeks.
- **Recovery:** Continues until kidney function is fully restored and can take up to 12 months.

CLASSES

AKI is classified as one of three classes.

- **Stage 1 (risk stage):** Serum creatinine 1.5 times baseline and urine output less than 0.5 mL/kg/hr for 6 hr or more.
- **Stage 2 (injury stage):** Serum creatinine 2 times baseline and urine output less than 0.5 mL/kg/hr for 12 hr or more.
- **Stage 3 (failure stage):** Serum creatinine 3 times baseline and urine output less than 0.3 mL/kg/hr for 12 hr or more.

TYPES

- **Prerenal:** Occurs as a result of volume depletion and prolonged reduction of blood flow to the kidneys, which leads to ischemia of the nephrons. Occurs before damage to the kidney. Early intervention restoring fluid volume deficit can reverse AKI and prevent chronic kidney disease (CKD).
- **Intrarenal:** Occurs as a result of direct damage to the kidney from lack of oxygen (acute tubular necrosis).
- **Postrenal:** Occurs as a result of bilateral obstruction of structures leaving the kidney.

HEALTH PROMOTION AND DISEASE PREVENTION

- Drink at least 2 L daily. Consult with the provider regarding prescribed fluid restriction if needed.
- Stop smoking.
- Maintain a healthy weight.
- Use NSAIDs and other prescribed medications cautiously.
- Control diabetes and hypertension to prevent complications.
- Instruct clients to take all antibiotics prescribed for infections.

ASSESSMENT

RISK FACTORS

Prerenal acute kidney injury

- Renal vascular obstruction
- Shock
- Decreased cardiac output causing decreased renal perfusion
- Sepsis
- Hypovolemia
- Peripheral vascular resistance
- Use of aspirin, ibuprofen, or NSAIDs
- Liver failure

Intrarenal acute kidney injury

- **Physical injury:** trauma
- **Hypoxic injury:** renal artery or vein stenosis or thrombosis
- **Chemical injury:** acute nephrotoxins (e.g., antibiotics, contrast dye, heavy metals, blood transfusion reaction, alcohol, cocaine)
- **Immunologic injury:** infection, vasculitis, acute glomerulonephritis

Postrenal acute kidney injury

- Stone, tumor, bladder atony
- Prostate hyperplasia, urethral stricture
- Spinal cord disease or injury

EXPECTED FINDINGS

In most cases, the findings of AKI are related to waste buildup and decreased urine output. However, almost every body system can be affected.

- **CARDIOVASCULAR:** fluid overload (dependent and generalized edema), dysrhythmia (hyperkalemia)
- **RESPIRATORY:** crackles, decreased oxygenation, shortness of breath
- **RENAL:** scant to normal or excessive urine output, depending on the phase; possible hematuria
- **NEUROLOGICAL:** lethargy, muscle twitching, seizures
- **INTEGUMENTARY:** dry skin and mucous membranes

The nurse should also assess for findings associated with the underlying cause.

LABORATORY TESTS

- Serum creatinine gradually increases 1 to 2 mg/dL every 24 to 48 hr, or 1 to 6 mg/dL in 1 week or less.
- Blood urea nitrogen (BUN) can increase to 80 to 100 mg/dL within 1 week.
- Urine specific gravity varies in postrenal type; can be elevated up to 1.030 in prerenal type or diluted as low as 1.000 in intrarenal type.
- Serum electrolytes: Sodium can be decreased (prerenal azotemia) or increased (intrarenal azotemia); hyperkalemia, hyperphosphatemia, hypocalcemia.
- Hematocrit: decreased
- Urinalysis: presence of sediment (RBC, casts)
- ABG: metabolic acidosis

DIAGNOSTIC PROCEDURES

- X-ray of the pelvis, or kidneys, urethra, and bladder (KUB) to detect calculi and hydronephrosis and to determine size of kidneys
- Ultrasound to detect an obstruction in the urinary tract
- CT scan without contrast dye or MRI to detect anatomical changes, tumors, or other obstruction; patency of ureters; and renal perfusion.
- Kidney biopsy to detect immunological disease or determine kidney dysfunction reversibility and need for dialysis therapy
- Nuclear medicine tests (cystography, retrograde pyelography)

PATIENT-CENTERED CARE

NURSING CARE

- Identify and assist with correcting the underlying cause.
- Monitor central venous pressure (CVP) and for hypotension and tachycardia.
- Monitor fluid intake and output strictly.
- Review laboratory values (BUN, creatinine, electrolytes, hematocrit).
- Avoid using nephrotoxic medications. If necessary, give these medications sparingly and decrease the medication dosage.
- Assess for edema and manifestations of heart failure or pulmonary edema.
- Restrict fluid intake as prescribed.
- Assess for flank pain, nausea, and vomiting (nephrolithiasis).
- Monitor for ECG dysrhythmias and changes (tall T waves).
- Monitor daily weights.
- Assess for changes in urination stream or difficulty starting the stream of urine.
- Assess the urine for blood or particles.
- Treat fever or infection promptly to prevent increase in the client's metabolic rate.
- Provide skin care to prevent injury (bathe with cool water, reposition frequently, provide adequate moisture).
- Provide psychosocial support to the client and family. Teach the client and family about prescribed treatments.
- Teach the client to perform coughing and deep breathing exercises, if lethargic.

NUTRITION

- Implement potassium, phosphate, sodium, and magnesium restrictions, if prescribed (depending on the stage of injury).
- Restrict fluid intake, if prescribed.
- High-protein diet to replace the high rate of protein breakdown due to stress from the illness. Possible total parenteral nutrition (TPN).

MEDICATIONS

- Administer IV fluid therapy as a fluid challenge to promote kidney perfusion, or as fluid replacement if the client is in the diuretic phase.
- Administer diuretics (furosemide, mannitol, ethacrynic acid) to promote increased filtration of blood by kidney.
- For AKI caused by medication nephrotoxicity, administer calcium channel blocker to prevent the movement of calcium into the kidney cells and to maintain cell integrity and increase the glomerular filtration rate (GFR).
- Sodium polystyrene sulfonate replaces sodium with potassium in the intestinal tract to promote potassium excretion.
- Sorbitol induces a bowel movement to promote excretion of excess potassium.
- In an emergency, IV medications (dextrose, insulin and calcium) can be required to reduce potassium.
- Administer sodium bicarbonate if the client has severe metabolic acidosis.
- For hyperphosphatemia, administer phosphate-binding agents.

THERAPEUTIC PROCEDURES

Continuous renal replacement therapy, hemodialysis, peritoneal dialysis

INTERPROFESSIONAL CARE

- Dietitian to calculate protein, calorie, and fluid needs
- Nephrology services to monitor kidney function

Chronic kidney disease

CKD is a progressive, irreversible kidney disease.

- A client who has CKD can be asymptomatic except during periods of stress (infection, surgery, and trauma). As kidney dysfunction progresses, manifestations become apparent.
- Older adult clients are at an increased risk for chronic kidney disease related to the aging process (decreased number of functioning nephrons, decreased GFR). 
- Older adults clients who are on bed rest, confused, have a lack of thirst, and do not have easy access to water are at a higher risk for dehydration leading to chronic kidney disease.

STAGES

CKD is comprised of five stages.

- **Stage 1:** Minimal kidney damage when GFR within expected reference range (greater than 90 mL/min)
- **Stage 2:** Mild kidney damage with mildly decreased GFR (60 to 89 mL/min)
- **Stage 3:** Moderate kidney damage with moderate decrease in GFR (30 to 59 mL/min)
- **Stage 4:** Severe kidney damage with severe decrease in GFR (15 to 29 mL/min)
- **Stage 5:** Kidney failure and end-stage kidney disease with little or no glomerular filtration (less than 15 mL/min)

HEALTH PROMOTION AND DISEASE PREVENTION

- Drink at least 2 L water daily. Consult with the provider regarding any restrictions.
- Stop smoking.
- Limit alcohol intake.
- Use diet and exercise to manage weight and prevent or control diabetes and hypertension.
- Adhere to medication prescription guidelines to prevent kidney damage.
- Test for albumin in the urine yearly (clients who have diabetes or hypertension).
- Take all antibiotics until completed.
- Limit over-the-counter NSAIDs. 

ASSESSMENT

- End-stage kidney disease exists when 90% of the functioning nephrons are destroyed and are no longer able to maintain fluid, electrolyte, and acid-base homeostasis.
- Dialysis or kidney transplantation can maintain life, but neither is a cure for CKD.

RISK FACTORS

- Acute kidney injury
- Diabetes mellitus
- Chronic glomerulonephritis
- Nephrotoxic medications (gentamicin, NSAIDs) or chemicals
- Hypertension, especially in African American clients
- Autoimmune disorders (systemic lupus erythematosus)
- Polycystic kidney disease
- Pyelonephrosis
- Renal artery stenosis
- Recurrent severe infections

EXPECTED FINDINGS

Nausea, fatigue, lethargy, involuntary movement of legs, depression, intractable hiccups

In most cases, findings of chronic kidney disease are related to fluid volume overload and include the following.

NEUROLOGIC: lethargy, decreased attention span, slurred speech, tremors or jerky movements, ataxia, seizures, coma

CARDIOVASCULAR: fluid overload (jugular distention; sacrum, ocular, or peripheral edema), hypertension, dysrhythmias, heart failure, orthostatic hypotension, peaked T wave on ECG (hyperkalemia)

RESPIRATORY: uremic halitosis with deep sighing, yawning, shortness of breath, tachypnea, hyperpnea, Kussmaul respirations, crackles, pleural friction rub, frothy pink sputum

HEMATOLOGIC: anemia (pallor, weakness, dizziness), ecchymoses, petechiae, melena

GASTROINTESTINAL: ulcers in mouth and throat, foul breath, blood in stools, vomiting

MUSCULOSKELETAL: osteodystrophy (thin fragile bones)

RENAL: urine contains protein, blood, particles; change in the amount, color, concentration

SKIN: decreased skin turgor, yellow cast to skin, dry, pruritus, urea crystal on skin (uremic frost)

REPRODUCTIVE: erectile dysfunction

LABORATORY TESTS

Urinalysis: Hematuria, proteinuria, and decrease in specific gravity.

Serum creatinine: Gradual increase over months to years for CKD exceeding 4 mg/dL. Can increase to 15 to 30 mg/dL.

BUN: Gradual increase with elevated serum creatinine over months to years for CKD. Can increase 10 to 20 times the creatinine finding.

Serum electrolytes: Decreased sodium (dilutional) and calcium; increased potassium, phosphorus, and magnesium.

CBC: Decreased hemoglobin and hematocrit from anemia secondary to the loss of erythropoietin in CKD.

DIAGNOSTIC PROCEDURES

Radiologic procedures to detect disease processes, obstruction, and arterial defects

- Ultrasound
- Kidneys, ureter, and bladder (KUB)
- Computerized tomography (CT)
- Magnetic resonance imaging (MRI) without contrast dye
- Aortorenal angiography
- Cystoscopy
- Retrograde pyelography
- Kidney biopsy

PATIENT-CENTERED CARE

NURSING CARE

- Report and monitor irregular findings
 - **URINARY ELIMINATION PATTERNS:** amount, color, odor, and consistency
 - **VITAL SIGNS:** blood pressure may be increased or decreased
 - **WEIGHT:** 1 kg (2.2 lb) daily weight increase is approximately 1 L of fluid retained.
- Assess and monitor vascular access or peritoneal dialysis insertion site.
- Obtain a detailed medication and herb history to determine the client's risk for continued kidney injury.
- Control protein intake based on the client's stage of chronic kidney disease and type of dialysis prescribed.
- Restrict dietary sodium, potassium, phosphorous, and magnesium.
- Provide a diet that is high in carbohydrates and moderate in fat.
- Restrict intake of fluids (based on urinary output).
- Monitor for weight gain trends.
- Adhere to meticulous cleaning of areas on skin not intact and access sites to control infections.
- Balance the client's activity and rest.
- Prepare the client for hemodialysis, peritoneal dialysis, and hemofiltration if indicated.
- Provide skin care in order to increase comfort and prevent breakdown.
- Protect the client from injury. **Qs**
- Provide emotional support to the client and family.
- Encourage the client to ask questions and discuss fears.
- Administer medications as prescribed.

MEDICATIONS

See the **RN PHARMACOLOGY REVIEW MODULE** for detailed information on these medications.

! Avoid administering antimicrobial medications (e.g., aminoglycosides and amphotericin B), NSAIDs, angiotensin-converting enzyme inhibitors, angiotensin-receptor blockers, and IV contrast dye, which are nephrotoxic.

Digoxin: a cardiac glycoside that increases contractility of the myocardium and promotes cardiac output

- Monitor digoxin laboratory levels and expect dosages to be reduced due to slow excretion of the medication with CKD.
- Monitor carefully for manifestations of digoxin toxicity, such as nausea, vomiting, anorexia, and visual changes. Monitor potassium level. **Qs**
- Administer digoxin after dialysis.

Sodium polystyrene: increases elimination of serum potassium.

- Restrict sodium intake. Sodium polystyrene contains sodium and can cause fluid retention and hypertension, a complication of CKD.

Epoetin alfa: stimulates production of red blood cells; given for anemia

Ferrous sulfate: an iron supplement to prevent severe iron deficiency

Calcium carbonate

- Taken with meals to bind phosphate in food and stop phosphate absorption.
- Take 2 hr before or after other medications
- Can cause constipation, so clients can require a stool softener.

Furosemide: a loop-diuretic administered to excrete excess fluids

- Avoid administering to a client who has end-stage kidney disease.
- Clients can also receive thiazide diuretics, potassium-sparing diuretics, and osmotic diuretics.

THERAPEUTIC PROCEDURES

- Peritoneal dialysis
- Hemodialysis
- Kidney transplantation

INTERPROFESSIONAL CARE

- Nephrology services to manage dialysis or kidney failure
- Nutritional services to manage the nutritional needs

CLIENT EDUCATION **QEBP**

- Instruct the client to monitor the daily intake of carbohydrates, proteins, sodium, and potassium, according to the provider's prescription.
- Instruct the client to monitor fluid intake according to fluid restriction prescribed by the provider.
- Instruct the client to avoid antacids containing magnesium.
- Encourage the client to take rest periods from activity.
- Educate the client who is receiving hemodialysis or peritoneal dialysis on an outpatient basis.
- Educate the client on how to measure blood pressure and weight at home.
- Encourage the client to ask questions and discuss fears.
- Encourage the client to diet, exercise, and take medication as prescribed.
- Advise the client to notify the provider if she observes skin breakdown.

CARE AFTER DISCHARGE

- Nephrology services is indicated if the client is to receive outpatient dialysis.
- Refer the client to a community support group relating to the disease.
- Consult nutritional services for the client's dietary needs.
- Refer the client to a smoking-cessation support group and counseling if needed.

COMPLICATIONS

Potential complications include electrolyte imbalance, dysrhythmias, fluid overload, hypertension, metabolic acidosis, secondary infection, and uremia.

Polycystic kidney disease

- Polycystic kidney disease (PKD) is a congenital disorder where clusters of fluid-filled cysts develop in the nephrons. Healthy kidney tissue is replaced by multiple non-functioning cysts.
- PKD is hereditary and is caused by a genetic mutation.
- PKD is more common in Caucasian clients.

FORMS: There are two forms of PKD.

- **Autosomal dominant trait:** Most common form. Cysts begin to multiply when the client reaches age 30.
- **Autosomal recessive trait:** Multiple cysts are present at birth.

ASSESSMENT

EXPECTED FINDINGS

- Familial history of PKD
- Anxiety, guilt
- Abdominal and/or flank pain
 - Dull pain indicates increased kidney size or possible cyst infection
 - Sharp pain indicates ruptured cyst or possible renal lithiasis (kidney stone)
- Headaches
- Hypertension caused by kidney ischemia from the enlarging cysts
- Enlarged abdominal girth
- Constipation
- Bloody and/or cloudy urine
- Renal lithiasis
- Hyponatremia
- Nocturia (excessive urination at night)
- Progressive kidney failure

LABORATORY TESTS

- Urinalysis
- Hematuria, proteinuria, and bacteria indicating infection
- Gradual increase of serum creatinine, BUN, creatinine clearance

DIAGNOSTIC PROCEDURES

Radiologic procedures to detect disease processes and cysts: ultrasound, CT, and MRI.

PATIENT-CENTERED CARE

NURSING CARE

HYPERTENSION CONTROL

- Controlling blood pressure is the highest nursing priority for clients who have PKD.
- Manage hypertension with prescribed medication.
- Teach the client and family how to measure and record blood pressure readings and daily weights.

PAIN MANAGEMENT

- Provide prescribed pain medications and nonpharmacological pain methods, such as relaxation, deep breathing, guided imagery, and distraction. Use NSAIDs cautiously in clients who have kidney disease.
- Apply dry heat to abdomen or flank areas to reduce discomfort.

INFECTION PREVENTION

- Administer antibiotics, such as ciprofloxacin and trimethoprim/sulfamethoxazole. Monitor for antibiotic-induced nephrotoxicity by evaluating serum creatinine levels and urinary output.
- Monitor urine specific gravity to assess renal function and hydration status.

CONSTIPATION PREVENTION

- Provide adequate oral fluid intake (as allowed per prescribed fluid restrictions), increase dietary fiber, and encourage client to ambulate.
- Assess bowel sounds and bowel movements.
- Administer stool softeners as prescribed.

THERAPEUTIC PROCEDURE

Needle aspiration and drainage of cysts

CLIENT EDUCATION

- Instruct the client to monitor blood pressure and weight daily.
- Instruct the client to notify the provider if she experiences an elevated temperature.
- Provide the client information on a low-sodium diet.
- Instruct the client to inform the provider if there are any changes in urine or bowel movements.
- Instruct the client to take all medications as prescribed.

CARE AFTER DISCHARGE

- Refer the client to a community support group related to the disease.
- Consult nutritional services for the client's dietary needs.

Application Exercises

1. A nurse is planning care for a client who has prerenal acute kidney injury (AKI) following abdominal aortic aneurysm repair. Urinary output is 60 mL in the past 2 hr, and blood pressure is 92/58 mm Hg. The nurse should anticipate which of the following interventions?
 - A. Prepare the client for a CT scan with contrast dye.
 - B. Plan to administer nitroprusside.
 - C. Prepare to administer a fluid challenge.
 - D. Plan to position the client in Trendelenburg.
2. A nurse is planning care for a client who has postrenal AKI due to metastatic cancer. The client has a serum creatinine of 5 mg/dL. Which of the following interventions should the nurse include in the plan? (Select all that apply.)
 - A. Provide a high-protein diet.
 - B. Assess the urine for blood.
 - C. Monitor for intermittent anuria.
 - D. Weight the client once per week.
 - E. Provide NSAIDs for pain.
3. A nurse is planning care for a client who has Stage 4 chronic kidney disease. Which of the following actions should the nurse include in the plan of care? (Select all that apply.)
 - A. Assess for jugular vein distention.
 - B. Provide frequent mouth rinses.
 - C. Auscultate for a pleural friction rub.
 - D. Provide a high-sodium diet.
 - E. Monitor for dysrhythmias.
4. A nurse is reviewing client laboratory data. The nurse should recognize that which of the following findings is expected for a client who has Stage 4 chronic kidney disease?
 - A. Blood urea nitrogen (BUN) 15 mg/dL
 - B. Glomerular filtration rate (GFR) 20 mL/min
 - C. Serum creatinine 1.1 mg/dL
 - D. Serum potassium 5.0 mEq/L
5. A nurse is assessing a client who has prerenal AKI. Which of the following findings should the nurse expect? (Select all that apply.)
 - A. Reduced BUN
 - B. Elevated cardiac enzymes
 - C. Reduced urine output
 - D. Elevated serum creatinine
 - E. Elevated serum calcium

PRACTICE Active Learning Scenario

A nurse is preparing to administer medication to a client who has chronic kidney disease (CKD). What information should the nurse consider when administering medication? Use the ATI Active Learning Template: Medication to complete this item.

MEDICATION: Identify three.

THERAPEUTIC USES: Describe how the medication is used to treat CKD.

NURSING INTERVENTIONS: Describe two for each medication.

Application Exercises Key

1. A. The nurse should not plan for a CT scan. Contrast dye is contraindicated for a client who has possible acute kidney injury.
B. Nitroprusside is a rapid-acting vasodilator used to rapidly reduce blood pressure for clients who have hypertensive crisis. It is contraindicated for clients who have hypotension.
C. **CORRECT:** The nurse should plan to administer a fluid challenge for hypovolemia, which is indicated by the client's low urinary output and blood pressure.
D. The nurse should position the client in reverse Trendelenburg, with the head down and feet up, to treat hypotension.
NCLEX® Connection: Physiological Adaptation, Fluid and Electrolyte Imbalances
2. A. **CORRECT:** The nurse should provide a high-protein diet due to the high rate of protein breakdown that occurs with acute kidney injury.
B. **CORRECT:** The nurse should assess urine for blood, stones, and particles indicating an obstruction of the urinary structures that leave the kidney.
C. **CORRECT:** The nurse should assess for intermittent anuria due to obstruction or damage to kidneys or urinary structures.
D. The nurse should weigh the client daily to monitor for fluid retention due to acute kidney injury.
E. The nurse should not administer NSAIDs, which are toxic to the nephrons in the kidney.
NCLEX® Connection: Physiological Adaptation, Alterations in Body Systems
3. A. **CORRECT:** The nurse should assess for jugular vein distention, which can indicate fluid overload and heart failure.
B. **CORRECT:** The nurse should provide frequent mouth rinses due to uremic halitosis caused by urea waste in the blood.
C. **CORRECT:** The nurse should auscultate for a pleural friction rub related to respiratory failure and pulmonary edema caused by acid base imbalances and fluid retention.
D. The nurse should monitor serum sodium and reduce the client's dietary sodium intake.
E. **CORRECT:** The nurse should monitor for dysrhythmias related to increased serum potassium caused by Stage 4 chronic kidney disease.
NCLEX® Connection: Physiological Adaptation, Alterations in Body Systems
4. A. The nurse should expect the BUN to be above the expected reference range, about 10 to 20 times the BUN finding.
B. **CORRECT:** The GFR is severely decreased to approximately 20 mL/min, which is indicative of stage 4 chronic kidney disease.
C. In stage 4 chronic kidney disease, a creatinine level can be as high as 15 to 30 mg/dL.
D. A client in stage 4 chronic kidney disease would have a potassium level greater than 5.0 mEq/L.
NCLEX® Connection: Reduction of Risk Potential, Laboratory Values
5. A. **CORRECT:** A manifestation of prerenal AKI is an elevated BUN caused by the retention of nitrogenous wastes in the blood.
B. Elevated cardiac enzymes is a manifestation of cardiac tissue injury, not AKI.
C. **CORRECT:** A manifestation of prerenal AKI is reduced urine output.
D. **CORRECT:** A manifestation of prerenal AKI is elevated serum creatinine.
E. **CORRECT:** A manifestation of prerenal AKI is reduced calcium level.
NCLEX® Connection: Physiological Adaptation, Illness Management

PRACTICE Answer

Using the ATI Active Learning Template: Medication

MEDICATION

- Digoxin
- Sodium polystyrene
- Aluminum hydroxide gel
- Furosemide

THERAPEUTIC USES

- Digoxin: A cardiac glycoside: increases contractility of the myocardium and promotes cardiac output.
- Sodium polystyrene: Increases elimination of potassium.
- Calcium carbonate : Binds to phosphate in food and stops phosphate absorption.
- Furosemide: A loop diuretic that causes diuresis of excess fluids.

NURSING INTERVENTIONS

- Digoxin
 - Monitor serum digoxin and potassium levels.
 - Monitor for manifestations of toxicity (nausea, vomiting, anorexia, visual changes).
- Sodium polystyrene
 - Monitor for hypokalemia.
 - Restrict sodium intake.
- Aluminum hydroxide gel
 - Administer this medication with meals, 2 hr before or after other medications.
 - Administer a stool softener with this medication.
- Furosemide
 - Monitor intake and output and blood pressure.
 - Avoid administering to a client who has end-stage kidney disease.

NCLEX® Connection: Physiological Adaptation, Illness Management